

Professional Military Education and the Emerging Revolution in Military Affairs*



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Professional attainment, based upon prolonged study, and collective study at colleges, rank by rank and age by age—those are the title reeds of the commanders of future armies, and the secret of future victories.

—Winston Churchill, 1946



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MILITARY THEORISTS and scholars throughout history have noted the occurrence of profound, discontinuous changes in the conduct—sometimes even the nature—of warfare. Recently, significant intellectual effort has focused on such an emerging “revolution in military affairs (RMA),” defined by the Office of the Secretary of Defense (Net Assessment) as “a major change . . . brought about by the innovative application of new technologies which, combined with dramatic changes in military doctrine and operational and organizational concepts, fundamentally alters the character and conduct of military operations.”¹ The notion of an RMA differs from the Soviet concept of a “military-technical revolution,” primarily by its emphasis on the nontechnological dimensions of military power. In the RMA paradigm, the “brainware” component is as important as—perhaps even more important than—the hardware component. Given this fact, consideration of the future focus and conduct of professional military education (PME) can be counted among the most vital tasks facing the Department of Defense (DOD) today. As we look to the future, the answers to two related questions are of potentially great importance. First, how can we leverage PME to better understand and exploit the potential of the RMA? Second, how can we leverage the RMA itself to enhance PME?

Education clearly is a critical component of managing and adapting to change in any organization and any area of endeavor. As their environments and the demands placed upon them change, individuals need to learn new facts and new ways of doing things—perhaps most importantly, new ways of thinking about things that can help equip them for a new and very different

world. In the military, arguably, the importance of education to equip us for revolutionary change is greater than it is in any other arena. As the world proceeds rapidly into a future of great uncertainty, the ability of our officers and enlisted personnel to think innovatively and strategically, to apply finely honed critical faculties and knowledge bases in any situation, “on the fly,” could be our single greatest force multiplier. If our military forces do not adequately understand the nature of the national security environment and do not intuitively grasp the fine points and implications of key trends in that environment and on the battlefield, the consequences could be immeasurably grave. At the microlevel, such failure could well be a matter of life or death; at the macrolevel, it could be a matter of national survival.

The PME system was established—and it has been maintained, continuously assessed, and improved—not with any “RMA” in mind, but certainly with the understanding that soldier training by itself is not enough. PME operates at the interface of intellectual development and operational art. It is intended to develop soldiers, sailors, and airmen with unparalleled intellectual and operational capabilities. The 1989 report of the Panel on Military Education, US House of Representatives (Skelton Panel), describes four “attributes of a strategist.” In the panel’s view, a strategist must be *analytical* (“able to move beyond . . . competency in any given subject area and develop inter-relationships”), *pragmatic* (“on top of emerging trends and constantly aware of the need to revalidate his strategic constructs”), *innovative*, and *broadly educated*.² As we enter a period of tremendous change and increasing complexity, these attributes are increasingly necessary in every officer, and PME must continue constantly to strive for new and innovative ways of ensuring that they are developed.

PME is intended to provide the student with three critical kinds of knowledge: the ethos, culture, and core values of his or her service; the technical and tactical skills appropriate to how that service wages war; and, most importantly, the wisdom and judgment to be applied in a multiplicity of situations. If we imagine an RMA,

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then it is important to consider whether and how some or all of these aims might have to be transformed. Must the ethos and culture of a service change as the world changes, or are these immutable? While many of the technical and tactical skills that have long been necessary to wage war will remain relevant on the future battlefield, some may become obsolete, some may change in nature, and other, novel skills may become critically important. The manner in which military judgment is honed may not change, but the kinds of situations in which this judgment must be applied may be utterly different from those that have been faced by soldiers up to the present day. The challenge for PME is to look at its *raison d'être* through the lens of the future and determine how to meet requirements that are themselves not yet clearly defined.

Revolution in Military Affairs: The Challenge

The challenges posed by the emerging RMA are legion, and PME will play an increasingly critical role in preparing our forces to understand and address them. We need consider only a handful of these challenges to get a sense of how important PME will be. First and foremost, we are faced with an environment of tremendous *ambiguity and uncertainty*. With the end of the cold war and with technology advancing at dizzying rates, it is a challenge to articulate and think through the operational requirements of the near-term, let alone the long-term, future. The identity of future competitors is unclear. New state and nonstate actors, their intentions and capabilities largely opaque to us, increasingly populate the landscape. We continue to wrestle with the implications of a diminished superpower threat, decreased resources for defense, and a plethora of limited, regional conflicts and operations other than war (OOTW). The seeds of a genuine revolution in international politics already are germinating, promising changes on the order of those seen following the French Revolution, in 1815 with the Concert of Europe, in 1870 after the unification of Germany, in 1919 with the end of World War I, and in 1945 with the end

of World War II and the creation of the United Nations. The common—and vexing—characteristics of all such international politico-military transformations, including today's, are uncertainty, vulnerability, ambiguity, complexity, and change. As the world changes, the fundamental purposes of military organizations—of the military itself—may change. The crucial role of PME will be to help future officers understand *how* the world is changing and to enable them to *determine* how the military must change to fit this new world.

New capabilities may call into question the roles and missions of established organizations and the relevance of their well-understood concepts; the concepts or organizations to replace them will not be self-evident. Indeed, if we consider the emerging notion of “information warfare,” it is increasingly unclear even what constitutes a “military” action and what does not, or where one would draw the line between war and peace. The PME system is uniquely suited to the vital task of preparing future military leaders not simply to operate but to *thrive* in such an environment, to adapt to rapidly changing conditions, and to reorient their thoughts and actions in real time to contingencies that may not be what they seem.

Second, the “*information revolution*,” while it offers previously unimaginable advantages to the future warrior, also presents significant challenges. The technology that is currently “digitizing” the battlefield (as well as the staff process, acquisition, and every other aspect of military affairs) will continue to move forward, likely at a rate even faster than we know today. People who are uncomfortable with, or who inadequately understand and exploit, the range of automated systems at their disposal will be unacceptably disadvantaged and likely will be vulnerable. The importance of information in warfare now rivals, and arguably may come to exceed, that of explosive force. Increasingly, the movement and manipulation of data—bytes and bits—is the indispensable enabler for positioning forces, putting steel on target, and executing all other critical functions of warfare. In the emerging revolution, information becomes akin to inventory, in that it loses its value and may become a *liability* with precipitous speed if it is not exploited in a timely manner.

PME provides a laboratory in which the future warrior can gain fluency in every aspect of the burgeoning information revolution. It offers a forum in which tomorrow's strategists and commanders can collectively define the embryonic notion of information warfare. It is the ideal setting for developing and inculcating the philosophy of jointness that information-based warfare demands. It is the venue in which we are able to consider how command and control will change as information becomes more distributed, to articulate and analyze the potential new operational and organizational concepts enabled by real-time sensor-to-shooter links, and to address a host of other information-technology issues that are not yet even recognized.

Thinking to date about the emerging RMA has suggested that the future environment will be characterized by *new warfare areas*. Whereas today's forces think in terms of mechanized ground combat, carrier operations, or air-to-air engagements, the forces of 2020 may find themselves in a world of long-range precision strike, information warfare, dominating maneuver, and space warfare. This kind of wholesale change in the paradigms of war carries with it a host of lesser-included changes that will challenge future forces. For example, new warfare areas will necessitate the development of *new doctrines*. Once written, these doctrines will need to be absorbed, critiqued, and understood by new generations of warriors. Consistent with the maxim that form follows function, *new organizational concepts* will be necessary to maximize our capabilities in the new warfare areas. Indeed, previous historical examples of RMAs suggest that new warfare areas are defined less by new technologies than they are by new organizations consciously designed to exploit *existing* technologies in unprecedented ways. A historical example would be the World War II blitzkrieg concept, in which the German army combined tanks, aircraft, and radios in Panzer units unlike the unit organizations in any Allied army.

New warfare areas will necessitate the development of new doctrines.

New *areas of expertise* and *specialization* may be necessary. By the year 2020, the role of an infantry soldier, a combat aircraft pilot, or a ship's navigator may look utterly different than it does today. The nature of the RMA may necessitate the establishment of other roles to complement or replace these well-recognized forces. In 2020, we may find it necessary to deploy space warriors, or hackers, instead of (or in addition to) a more traditional military force. As they have been for generations in more familiar specialty areas, PME institutions will be vitally important to elevate training in these emerging areas into high art, and to hone the practitioners of such new warfare areas into virtuosos.

The very *shape* and *nature of the battlefield* likely will change, and the PME system will be the key to preparing our future warriors for such change. Indeed, the vernacular is already changing to *battle space*, a place potentially very different than any battlefield we have previously known. The battle space of 2020 may be geographically vast, literally thousands of kilometers wide and deep; it may extend beyond geography entirely to include space and cyberspace; some analysts argue it will go beyond the three dimensions of breadth, depth, and height to include the fourth "dimension" of time.

With such changes in our conceptualization of *where* war is fought, there will be corresponding changes in *how* it is fought. The pace and tempo of future warfare will be unprecedented. In the RMA future, the battlefield objectives—the centers of gravity—may be fundamentally different than those we imagine today. As early as the 1980s, the Army began exploring the notion of "nonlinear warfare." In a linear paradigm, changes in input are proportional to changes in output, and the whole is equal to the sum of the parts (e.g., two men do twice the work that one man can do). Nonlinearity is better



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understood in terms of chaos theory (i.e., “characterized by random interactions, complex feedback loops, and wild changes in results based on small variations in initial conditions”).³ Warfare in the future may be dominated by nonlinearity, with small, extremely capable units, enhanced by extraordinary battlefield information and awareness, operating independently of each other and discontinuously in terms of time, space, and enemy forces. The military forces required to successfully execute this type of warfare will need education in areas that are not yet clear—education that can be provided only by the PME institutions of the future.

Other potentially defining characteristics of warfare in the future battle space include *asymmetry* (attacking or responding with forces wholly unlike the forces against which one is

poised, with the aim of invalidating enemy assumptions and set-piece plans), *nonlethality* (might information warfare, or new neural or other nonlethal agents, become so prevalent as to have decisive effect on their own?), or *civilianization* (information warfare is again a useful example—to what extent might war be fought from stateside computer consoles by individuals who have never donned a uniform?). Work to date exploring the RMA has begun to consider the implications of these and other trends as they relate to future operational and organizational concepts, but this is only a beginning. In-depth consideration of the shape and nature of the future RMA environment is an activity ideally suited to the joint and service PME institutions, for it is in these institutions that the environment will be understood and future leaders will be fashioned.

The preceding discussion is, of course, only exemplary, and it is by no means exhaustive. The point is not to dwell on what the emerging RMA might look like; although some aspects of this future are relatively clear (e.g., the ever-increasing reliance on information technology in all aspects of military affairs), the majority of the “answers” are still well outside our grasp. Rather, the point is to survey the *kinds* of issues and problems the future warrior will be required to master, and the sheer volume of intellectual and operational changes that will characterize the RMA environment. As noted in the recent report of a panel on joint PME convened by the chairman of the Joint Chiefs of Staff, “Now more than ever, the officer corps must be able to think creatively, reason critically, and act decisively in the face of ambiguity and uncertainty; [further,] they must . . . anticipate, welcome, and utilize the wave of technological advances sweeping us forward.”⁴

To be successful in navigating the revolutions of the future, military officers will need greater mental agility than ever before, and they will have to be able to draw upon a larger, broader spectrum of concepts and skills. They will be required to think, not like bricklayers, who are given materials and told what to do with them, but like architects, who can themselves determine what kinds of structures will be necessary and appropriate for the future environment.⁵ More than ever before, as warfare moves into uncharted waters, innovative, career-long learning will be of critical importance to the military and other members of the defense establishment to foster the requisite “architect mind-set.” The utility and value of PME in the period ahead cannot be overstated.

Historical Precedent of PME and RMA

The foregoing allusion to blitzkrieg is instructive when one considers the potential role of PME in developing revolutionary new approaches to military affairs. The emphasis on officer and other professional education in Germany during the interwar period was enormous, and one can argue

that the seeds of that particular RMA were planted and nurtured in the *Kriegsakademie*. Gen Hans von Seeckt, chief of the German General Staff and commander of the army between 1919 and 1926, instituted policies that significantly expanded and enhanced the education of the officer corps that later developed the blitzkrieg concept and led the German army in World War II.

Precommissioning educational requirements for officer aspirants were increased, and the program of instruction for those accepted as candidates was, according to James Corum, “one of the most strenuous officer training systems ever devised.”⁶ Officer candidates spent two full years in practical academic and troop instruction, with significant emphasis placed on how technology developments such as motorization might affect future operational- and tactical-level warfare. Upon completion of this regime, candidates continued their formal education at the unit level, including lectures and seminars, staff rides to consider specific tactical problems in the field, and preparation for the extremely demanding exams for entry into the General Staff.

Officers who successfully completed the General Staff exams embarked upon an additional *four-year* period of education and training which continued to emphasize technology applications, tactical problem solving at the higher (combined-arms regiment, division, corps, and army) levels, and innovative concepts for waging war. Pedagogy consciously fostered such innovation. For example, there were no “correct” solutions for the tactical problems; each officer’s response was judged individually and debated in seminars. The system of PME in Germany in the interwar period was characterized by its broad curriculum, practically oriented pedagogy, emphasis on leading-edge technologies and operational concepts, combined-arms focus, and inculcation of independent thinking. When the German army launched its lightning attacks on Europe in 1939 and 1940, the officers who led it had undergone an unprecedented professional education process. This reorganized army executed a revolutionary operational concept that arguably could not have been conceived without such an emphasis on officer professional development.⁷

The US military also experienced a nascent RMA in the interwar period, which it then exploited with overwhelming success in World War II. As in the German case, one cannot overlook the role of PME in fostering this RMA. The victory of American forces against Japan was enabled by revolutionary new operations and organizations—carrier aviation, carrier battle groups, and “island hopping”—painstakingly developed over many years of war gaming at the Naval War College in Newport, Rhode Island. The program at Newport was unlike any other before or since in its almost total reliance on war gaming as a pedagogical method. In 1932, for example, out of a 326-day academic year, no less than 304 days were devoted to gaming.⁸ Over two decades, PME at the Naval War College played a critical role in the development of a new strategic outlook and operational focus for the US Navy. Particularly from 1930 onward, the game scenarios and designs tested concepts for large-scale, joint Navy-Army amphibious operations—long wars fought thousands of miles across the Pacific, made possible by logistics fleet trains and carrier-based aviation operations that were still only notions at the time.

The gaming at Newport provided future World War II commanders the opportunity to think through and repeatedly experiment with operational requirements for a war unlike any the Navy had ever planned for or fought. Importantly, the latest aircraft developments and other technology advances were continually woven into the play of the games and tested to the extent possible in fleet exercises that were built around war college game concepts. According to Michael Vlahos, “Through the interwar era [Newport] was the operating theater of the War Plans Division. In war-game and postmortem analysis, Washington’s plans against [Japan] were tested and measured, purified and recast. Newport was the laboratory.”⁹ The fact that these plans detailed a revolutionary new type of warfare indicates the importance of the war college venue. Only in such a setting could this laborious, deliberate, and unprecedented process of experimentation and learning have been executed.

With the exception of the Naval War College,

during the interwar period the higher-level PME institutions (i.e., command and staff colleges and war colleges) were not in the business of innovation to the same extent as the more specialized lower-level branch schools (e.g., the Army Infantry School). The impact of PME on military innovation during this period also varied by service. For example, the Army War College, US Army Command and General Staff School, and Army Industrial College all prepared officers for mobilization planning, as well as for staff duty at varying levels. These institutions transmitted doctrines already in widespread acceptance but did little experimentation or innovation. At the same time, each of the Army’s branches maintained its own school, as they still do today. It was at this level that the Army educational establishment had the explicit mission to develop new doctrine, weapons, and tactics. These schools acted as think tanks and worked closely with the department and bureau staffs to develop doctrinal and weapons innovations. Among the innovations developed in the branch schools were early theories about strategic bombardment (Air Corps Tactical School), mechanized warfare (Cavalry School), and the integration of radios and radar in ground campaigns (Signal Corps School). Unfortunately, the structure of the PME system was not well designed to *institutionalize* such innovations. Ideas that emerged in the branch schools tended to develop in isolation, partly because the higher-level institutions made little attempt to integrate new concepts for servicewide application. Those attempts that were made, primarily through board studies at the General Staff level, also did not have much success. More importantly, no doctrinal agency existed to draw together ongoing studies and experimentation, lessons of innovations observed in foreign nations, and lessons of training exercises.¹⁰

PME and RMA: Present and Future

The above examples touch only slightly on the role of PME in these two historical RMAs. They are intended simply to suggest the dual value of

PME in adapting to periods of profound change in warfare—the specific, substantive teaching it provides and the overall attitudinal *learning* that it makes possible. Consideration of PME in the context of an RMA is important because of the impact this education can have on the officer-student, both in terms of factual knowledge and, perhaps more importantly, in *ways of thinking or looking at the world*. PME is the venue in which future military leaders can absorb the most up-to-date knowledge about trends in politics, international relations, economics, technology, and so forth. Additionally, it provides the opportunity for these officers to learn the state of the art in military strategy and operational planning. These areas have long been the critical substance of an officer's development in PME, and they will continue to stand as prerequisites to an understanding of the nature and conduct of warfare.

One of the great challenges in considering PME of the future is determining how and how much of the necessary "RMA perspective" falls *outside* of these areas. To what extent must the future war planner or battlefield commander have mastered the nuances of chaos theory or computer programming? Might a background in biotechnology or anthropology be a prerequisite for conducting future threat estimates? How might a course on successful (and unsuccessful) innovations in commercial business contribute to the development of future DOD concept developers and program managers? The future will be characterized by an unprecedented interdependence of information and erosion of the "walls" between areas of knowledge. In this future, we will look increasingly to PME to develop leaders who can bring to bear their education in a diversity of areas, including areas that may now seem well outside what has traditionally been considered military affairs.

As important as any particular subject area, PME can be the venue in which future leaders hone their ability to think innovatively and *futuristically*. Indeed, the impact of PME on the future officer's worldview is particularly important as we move into a period of potentially revolutionary change. The report of the Skelton Panel focused considerable attention on the role of PME in fos-

tering jointness. According to the panel, PME should develop fluency not only in the missions, practices, and capabilities of an officer's individual service but also in the planning and conduct of joint-force operations. In looking to the future, one finds it useful to think about PME in similar terms but to substitute *RMA* where the panel spoke of jointness.

For example, it is often stressed that service and joint PME should both contribute broadly to the fostering of a joint perspective and that they should help shape *attitudes* about the employment of joint forces. In the future, it will be important for PME to foster an analogous "RMA perspective" such as that alluded to in the paragraph above—a broad-based understanding that the world of 2020 will look profoundly different from the world of today, and comfort with highly advanced technologies and previously unfamiliar ways of waging war. The battlefield commander of the future must be at ease with the prospect of developing and employing "RMA forces" that in many cases do not yet even exist; indeed, in an era of fundamental change, PME is the ideal (and may be the only) arena in which future commanders and operators, as a group, can themselves *identify* what new kinds of capabilities and concepts are necessary and how they might be employed.

In the same vein, both service and joint PME are intended in large part to develop an understanding of how different services and forces optimally work together. In the future, it will be critical for PME to develop in its student population a sense of how new warfare areas will be integrated and how they will enhance and support each other. Analysis to date has suggested that "the RMA" will be at the intersection of a Venn diagram whose circles are the warfare areas of precision strike, information warfare, dominating maneuver, and space warfare. Whether these are the "right" four warfare areas is, in the context of this essay, irrelevant. The point is that victory will reside in a complex *fusion* of capabilities across the spectrum of warfare, to a degree that even current notions of joint warfare cannot begin to suggest. The operational and organizational concepts for this new way of warfare do not yet ex-

ist, and PME can provide a uniquely capable laboratory in which to develop and test them.

Importantly, PME institutions are an arena for the development of doctrine; this is particularly true of Army PME institutions (e.g., Army Command and General Staff College, where a key goal is to develop combined arms doctrine and assist in its integration throughout the Army), but to a lesser degree it is characteristic of all the service schools. The report of the Skelton Panel places great emphasis on the potential role of PME in developing *joint* doctrine, suggesting that the National Defense University (NDU) schools in particular be "given a major share of the responsibilities for . . . developing workable joint doctrine [and] related organizational concepts, practices, and procedures."¹¹

In the same manner, PME institutions represent an ideal venue for the development of "RMA doctrine," which will undergird the highly complex and fluid, information-based, joint and combined warfare of the future. The development of such doctrine will be a long and painstaking process, given that we are only beginning to understand and articulate the shape and nature of the emerging RMA. Indeed, it is almost certainly too early to be developing any authoritative or prescriptive doctrine for the RMA. The eventual RMA doctrine will be a product distilled from extensive, unfettered *experimentation* and intellectual ferment. By providing an environment that promotes and supports such experimentation, PME will be instrumental as we move along this road.

Innovation in Process and Pedagogy

As with the substance of PME, the *process* of PME will also face a range of unprecedented challenges and opportunities in the future RMA environment. Innovations in educational technology and pedagogical methods, which in and of themselves may have little to do with military affairs, can be assessed for their potential application in PME. Although some innovations may facilitate military education in uniquely valuable ways, others may be inappropriate or even injuri-

ous in the unique context of PME. It is important to consider how "distance learning" techniques (e.g., satellite broadcast or videotaped courses, interactive on-line seminars, etc.), multimedia instructional programs, artificial intelligence and "expert systems," virtual reality, and a host of other so-called hyperlearning tools might be utilized in PME. Incorporating these innovations into PME offers, in one view, both direct and indirect benefits: attractive for their potential to directly facilitate learning, such tools and methodologies would also increase the officer-student's familiarity with and understanding of technologies and procedures likely to dominate the future operational and planning environment.

A range of advanced technologies and other information resources must be considered for their potential utility in PME. For example, one can apply commercially available neural networks to great effect in many types of courses as customized decision-support tools, preparing students to use similar technologies that may have a prominent role on the future battlefield. Increasingly sophisticated tools are being designed to assist users in searching through and exploiting the vast proliferation of data sources; many of these are able to categorize and *qualitatively evaluate* information vis-à-vis specified goals and objectives, and even to engage in dynamic recalculation as additional information is obtained *during* the user's decision process. Such technologies also will have an important place in the design and execution of military operations, and they can and should be incorporated in PME programs. Still more exotic are visualization and "data mining" tools currently under development. These tools are designed to build a graphic "map" for the user of the connections between discrete but related concepts and data points. The technology is believed to have great potential for increasing comprehension and retention of information and concepts, as research indicates that the human brain responds differently—in some ways more effectively—to visual cues than to text.

Although the amount of information and knowledge that military personnel must assimilate grows exponentially, there are still only 24 hours in the day. Thus, it will be important to

continue increasing *educational* productivity in PME through the extensive use of advanced educational technology and new pedagogical approaches. Great strides in this area have been made at Air Command and Staff College (ACSC) at Maxwell AFB, Alabama, and similar advances increasingly are occurring at other PME institutions. At ACSC, each student receives a powerful laptop computer at the beginning of the program, into which is loaded the school's entire "paperless" program of study. The curriculum has been completely restructured along multidisciplinary lines, with increased horizontal integration across academic as well as military specialty areas. Students receive 100 books when they arrive, theirs to keep upon graduation, which range from Sun Tzu to Alvin Toffler, from business school texts to science fiction. Contact (classroom) time has been reduced in favor of independent and group research and affective learning. Often, the products of student research projects are folded back into the program for the use of subsequent classes, sometimes in the form of highly advanced educational software tools. The program at ACSC is a unique combination of traditional and novel substance, conceived and executed with an eye toward the high-tech future, that must be considered as a harbinger of the direction that future higher education may take.

The verdict is not yet in, even in civilian educational circles, on the kinds of technology and other approaches suggested above. However, ongoing work at such leading-edge institutions as the Learning Research and Development Center, the Institute for the Learning Sciences, and the Institute for Academic Technology suggests significant benefits. Consideration of the high-tech future for PME is at a similarly early stage, but a concentrated look at the issues and prospects through an RMA lens would be of potentially great value. As suggested above, some factors unique to PME may argue against otherwise salutary educational techniques. For example, one prominent trend in education in the last decade has been "asynchronous learning"—that is, individualized programs of learning whose pace *and content* are largely or entirely directed by the student. Although innovative, a program design that allows

officers to tailor their education, based on individual interests and preferred learning modes, may not be appropriate for the unique environment of PME, given the critical importance of uniformity in the knowledge base of our future military leaders.

Similarly, the logical (to some people, inevitable) extension of the distance-learning concept is a system in which *no* schools or classrooms exist—all teaching and learning would be done online or through some other combination of hyperlearning tools.¹² Here again, there could be some unambiguous benefits. Perhaps most obviously, in an era of shrinking budgets and personnel reductions, one might save significant sums of money by not sending thousands of officers to in-residence PME each year. Officers could spend more time in operational assignments while still gaining their professional education. However, much as grade school and high school are valued for their role as a primary socialization experience, so too does PME provide a vital affective component. It is not clear to what extent esprit de corps and the joint, *team* perspective and mind-set so critical to military operations could be replicated in a "virtual" PME environment.

Issues and Considerations

Several specific, interrelated issues must be at the center of debate over the future of PME.

Textbooks or Hypertext?

First is the matter of pedagogical approach. Should PME adopt a new, high-tech approach or retain the established classroom, textbook, and lecture model? Should we shift to a virtual PME program or continue to require residence at institutions? Such arguments are red herrings; as in all higher education, PME must craft an idiosyncratic balance of the old and new, the proven and the innovative. Virtual or distance learning offers a number of benefits—most importantly, the flexibility it allows for both students and faculty to pursue educational objectives on the fly.¹³ On the other hand, in this approach one loses the

ability to spend concentrated time on education; the student at a resident PME institution is there for PME and nothing else and is not forced to pursue his or her education episodically, as other duties and distractions permit.

Similarly, educational technologies can facilitate the transmittal of a great deal of information, but information by itself is inadequate. PME is much more than the transmission of facts; it is about inculcating analytical skills, critical thinking, and ethos and wisdom. Some people feel that a technology-based approach is not well suited to this more affective kind of learning, that such concepts and skills can only be imparted face-to-face. Affective learning—students learning from each other and absorbing the experience of their predecessors—clearly remains paramount, but this can and must be *facilitated* by new educational technologies, electronic networking, and other technological means.

Philosophical Approach

Even more important than any debate about technologies and techniques is the matter of philosophical approach. The traditional pedagogy is, simply, no longer valid—for PME or any other form of higher education. An approach that is *teacher* and *teaching*-centered (i.e., characterized by relatively passive *transmittal of information*, in lecture form, from subject-matter experts to student receptors) must be replaced with an approach that is *learning* and *student*-centered—a participative, experiential process in which information is exchanged in two-way dialogue between “coinquirers.” PME must evolve from such passive transmittal and absorption of information to active engagement in the *construction* of knowledge, from classroom learning to real-world fusion of theory and practice, from text and speech orientation to multiple representations of ideas, and from learning as an individual act in isolation to learning as a collaborative act in the context of other ideas.¹⁴

PME must increasingly become demand-driven as opposed to supply-driven. It may be useful to think in terms of a “precision learning”

paradigm in which students can tailor their educational programs to what they most need to learn, at the pace and level most appropriate for them. Greater interaction between students and PME faculties and administrations in the development and continual evolution and tailoring of programs will result in more efficient and effective learning. We need more “instant” minicourses on specific topics, developed and executed in real time in response to rapidly changing educational and individual requirements. Ideally, one would develop such courses at the joint level, with service and other PME institutions pooling faculty, technologies, and other resources to the needs of the moment while still pursuing their more enduring objectives.

PME Structure—Beyond Institutional Orthodoxy

We must also consider the structure of the overall PME system. The importance of service-specific education remains great, and this will not change so long as separate military services exist. However, whether this specialization in education must continue only in separate, service-specific *institutions* is not intuitively clear. Perhaps individual campuses devoted to a particular service or particular type of military activity (e.g., command and staff responsibilities or operational-level planning) will coexist alongside multiple satellite campuses throughout the world. For the foreseeable future, the services *should* maintain their PME institutions, but cooperation among them must be enhanced to conserve resources, to make optimum use of new technologies, and to achieve common, joint outcomes. Rather than merging institutions formally so that the individual components of the merger cease to exist, the services can and should do more to merge their institutions “virtually” (i.e., link them in computer networks, share faculty members, etc.).

A separate but related question has to do with whether we need wholly new PME institutions as we move into the emerging RMA. Pointing to the recent establishment of the Information Resources Management College at NDU, some people believe that new PME institutions will be

critical and that simply adding an hour or two of RMA instruction to established programs at existing institutions will be woefully insufficient. Others argue that, while studying and considering the implications of the information revolution and the RMA are important, focusing future PME solely on these concepts, to the exclusion of more traditional warfare and national security concepts, would be a mistake. Segregating consideration of new warfare concepts to discrete institutions may in fact be precisely the *wrong* way to move the thinking of the military as a whole toward an emerging RMA. To do so risks leaving all the old assumptions and old ways of thinking intact at the *existing* institutions, which will continue to have a significant influence on succeeding generations of officers. If a critical mass is to form around emerging RMA ideas, a more effective approach may be to give these ideas a prominent—though not exclusive—place in existing courses and institutions.

One must begin thinking of PME more as a comprehensive, cradle-to-grave system, integrated with training. As in the civilian world, it is absurd to think today that a soldier's or an officer's education can ever be completed. One must make time and devise methods to continually deepen knowledge and hone skills. Currently, we have few refresher courses or other institutionalized avenues by which one may enhance and bolster a command and staff or war college education. A single stint at a particular PME institution may not be adequate preparation for a rapidly changing global politico-military environment. It is worth considering how future soldiers might benefit from periodic, brief, but focused bursts of PME throughout their careers—or from a system in which PME is essentially constant with the aid of distance-learning technologies and techniques touched on above.

New Faculty Maestros

The question of appropriate faculty mixes for future PME is also important to consider. Because technology and new concepts such as complexity and chaos theories will largely drive the emerging military revolution, we will need different

kinds of experts to round out faculties at PME institutions across the system. The majority of faculty historically has been concentrated in the social sciences. We will still have a great need to retain these individuals to convey to students the intangibles of warfare (the wisdom, judgment, and historical experience that is at the core of warfare and thus must be at the core of PME). But we will have to supplement them with more engineers, computer scientists, psychologists, biologists, and others who can provide insights and new ways of thinking about new kinds of military problems we are likely to face.

The example of the nonprofit group “National Faculty” is a good one to keep in mind when considering how to keep up with changing faculty requirements in PME. This organization maintains databases and employs a range of technologies to virtually “import” teachers and other scholars from across the country to remote locations, enabling them to teach in multiple locations simultaneously. This model could be usefully applied in PME to create a dispersed national faculty and perhaps even to have top graduates of PME institutions become virtual faculty members teaching from the field.

Student Population—Whom Should We Educate?

We must consider as well the *focus* of future PME and decide whether it should remain the preserve of the elite or become more of a mass activity. The emerging RMA will demand a greater level of intellectual sophistication on the part of all personnel. At the same time, the military, like any organization, will produce only a handful of strategists—a small innovative elite—alongside a larger group of individuals who will absorb and actualize the concepts developed by others. Should PME continue to be tailored for the former group, to ensure that revolutionary new concepts in fact are developed? Conversely, *can* such innovations be actualized by military forces that are not being educated across the board in the ways of the emerging RMA? The question is how to gear PME appropriately for both types of individual,

since the type of education required for one likely will be very different than that required for the other.

The emerging RMA may require development of an intellectual superstructure—a body of knowledge workers who will have missions and responsibilities far broader and more diverse than leading forces in battle. At the same time, we should extend and deepen PME throughout the force, as we increasingly will rely on personnel of all ranks to execute tasks and employ ideas far different and more challenging than those we know today. It is worthwhile to consider adopting and expanding for other PME levels and institutions the approach now in place in the service command and staff college second-year programs, in which an elite group is selected from the larger student body, in a very discriminating process, to pursue an advanced course of study.

Incubators for Innovation

Finally, we must stress the critical role of PME as a haven for heretical ideas in a revolutionary period. PME institutions are, arguably, the only venue in the military in which people can challenge accepted practices and theories without damaging daily operations. In a revolutionary time, our only recourse will be to jettison some of these accepted practices and theories and replace them with ideas that have no precedent. PME institutions must be the bastions of independent—even iconoclastic—thought, where we can generate such ideas and work them into the military mainstream. To make them so will require a commitment on the part of the institutions to protect and nurture individuals who take intellectual risks. An interdisciplinary curriculum, academic freedom for the faculty, and consideration of a range of ideas from any and all intellectual sources must be the hallmarks of future PME, in order to provide an education that meets the challenges of the RMA.

Conclusion

The issues and questions raised in this article are critical to the future of PME and, more broadly, to the development of military affairs. Technological and pedagogical innovations are already beginning to emerge throughout the PME system. One aim of this discussion is to consider how such innovations might facilitate our adaptation to and exploitation of an emerging RMA. Even more important is the *substance* of PME in the context of an RMA (i.e., the content and educational aims of various PME programs). The object at this point is not to make predictions or recommendations about what should be taught and learned in future PME—nor is it to suggest *how* future PME should be taught. As with the RMA itself, it is too early in the intellectual process to speak definitively in these areas.

Rather, the object is to *begin to consider*, in light of the emerging RMA, what should be learned in PME, who should learn it, how future officers should be taught, and who should teach them. The object is to push the intellectual process forward and to consider how a period of revolutionary change in military affairs might both affect and be affected by PME content and process. This article does not provide the answers. Rather, we must pose questions about the RMA to today's PME teachers, program developers, and other specialists in education, for it is *their* expertise that can best answer the questions. For example, what substantive issues related to emerging new warfare areas will be most important to consider in PME curricula as they evolve? What substantive issues related to emerging new warfare areas will be most difficult to address in future PME? What *core competencies* will be most important to foster in PME? Who will be the educators in future PME, and what backgrounds must they have? What existing or emerging educational technologies can best facilitate PME? What effect will potential organizational innovations in the military have on PME? How can PME *facilitate* organizational change? How can PME best

foster innovative, unorthodox thinking and intellectual risk taking in our future military leaders?

The intellectual excellence necessary for the US military to thrive in an era of uncertainty and profound change can realistically take root only in the PME arena. The emerging RMA environment

will call for fundamental shifts in our thinking, and the role of PME in clarifying the nature and direction of those shifts—even in acclimating us to the notion that such shifts are necessary—will be of tremendous importance. □

Notes

1. Andrew W. Marshall, director of net assessment, Office of the Secretary of Defense, memorandum, 23 August 1993.
2. House, *Report of the Panel on Military Education of the Committee on Armed Services*, 100th Cong., 1st sess., 21 April 1989.
3. Michael J. Mazarr, "The Revolution in Military Affairs: A Framework for Defense Planning" (Paper presented at the US Army War College Fifth Annual Conference on Strategy, Carlisle Barracks, Pa., April 1994).
4. *A Strategic Vision for the Professional Military Education of Officers in the Twenty-First Century*, Report of the Panel on Joint Professional Military Education of the Chairman, Joint Chiefs of Staff (Washington, D.C., March 1995), 5–6.
5. Credit for the analogy goes to Col John Warden III, USAF, Retired.
6. James S. Corum, *The Roots of Blitzkrieg: Hans von Seeckt and the German Military Reform* (Lawrence, Kans.: University Press of Kansas, 1992), 82.
7. For additional, detailed background on the German PME and training system in the interwar period, see *ibid.*, 68–96; Martin van Creveld, *The Training of Officers: From Military Professionalism to Irrelevance* (New York: Free Press, 1990), 28–34; and David N. Spiers, *Image and Reality: The Making of the German Officer, 1921–1933* (Westport, Conn.: Greenwood Press, 1984).
8. Michael Vlahos, *The Blue Sword: The Naval War College and*

the American Mission, 1919–1941 (Newport, R.I.: Naval War College Press, 1980), 134. This book is an extraordinarily rich and detailed portrait of the Naval War College program in the interwar period.

9. *Ibid.*, 114.

10. Discussion drawn from Dr Allan Millett, Mason Professor of Military History, Ohio State University, presentation to the Conference on Professional Military Education and the Emerging Revolution in Military Affairs, National Defense University, Washington, D.C., 22–23 May 1995.

11. *Report of the Panel on Military Education*, 63.

12. See Lewis J. Perelman, *School's Out: A Radical New Formula for the Revitalization of America's Educational System* (New York: Avon Books, 1992).

13. The benefits and drawbacks of a "virtual PME" approach are explored in "Professional Military Education (PME) in 2020," prepared by the students and faculty of Air University, Maxwell AFB, Ala., June 1994, as part of the *Spacecast 2020* study. For a revised version of the paper, see "Professional Military Education in 2020," *Airpower Journal* 9, no. 2 (Summer 1995): 27–41.

14. Discussion inspired by Maj Gen Richard Chilcoat, commandant, US Army War College, presentation to the Conference on Professional Military Education and the Emerging Revolution in Military Affairs, National Defense University, Washington, D.C., 22–23 May 1995.